

WHAT IS CLAIMED IS:

1. A process for preparing a catalyst, said process comprising:

selecting a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes;

depositing one or more catalytically reactive metals comprising silver on said carrier; and

depositing one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof prior to, coincidentally with, or subsequent to the deposition of said one or more catalytically reactive metals.

2. A process according to claim 1 wherein the one or more promoters comprise lithium.

3. A process according to claim 2 wherein the one or more promoters comprise in addition a Group IA metal which is selected from potassium, rubidium, cesium, sodium, and combinations thereof.

4. A process according to claim 1 wherein the one or more promoters are selected from sulfur, phosphorus, boron, fluorine, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.

5. A process according to claim 4 wherein said Group IIA metal is selected from magnesium, calcium, strontium, barium, and combinations thereof.

6. A process according to claim 4 wherein said Group VIII metal is selected from cobalt, iron, nickel, ruthenium, rhodium, palladium, and combinations thereof.

7. A process according to claim 4 wherein said rare earth metal is selected from lanthanum, cerium, neodymium, samarium, gadolinium, dysprosium, erbium, ytterbium, and combinations thereof.

8. A process according to claim 4 wherein the one or more promoters comprise rhenium.

9. A process according to claim 1 wherein said sodium solubilization rate has been achieved by a means effective in rendering ionizable species on the carrier surface ionic and removing that species, or rendering the ionizable species insoluble, or rendering the ionizable species immobile.

10. A process according to claim 9 wherein said means is selected from washing, ion exchange, volatilizing, impurity control, precipitation, sequestration, and combinations thereof.

11. A process according to claim 1 wherein said metal is deposited on said carrier by submersing said carrier in an impregnation solution wherein a hydrogen ion activity of said solution is lowered.

12. A process according to claim 11 wherein said hydrogen ion activity is lowered by addition of a base to said impregnation solution.

13. A process for preparing a catalyst suitable for the vapor phase production of epoxides, said process comprising:

selecting a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes;

depositing one or more catalytically reactive metals comprising silver on said carrier; and

depositing one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof prior to, coincidentally with, or subsequent to the deposition of said one or more catalytically reactive metals.

14. A process according to claim 13 wherein the one or more promoters comprise lithium.

15. A process according to claim 14 wherein the one or more promoters comprise in addition a Group IA metal which is selected from potassium, rubidium, cesium, sodium, and combinations thereof.

16. A process according to claim 14 wherein the one or more promoters comprise in addition a Group IA metal which is cesium.

17. A process according to claim 13 wherein the one or more promoters are selected from sulfur, phosphorus, boron, fluorine, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.

18. A process according to claim 17 wherein said Group IIA metal is selected from magnesium, calcium, strontium, barium, and combinations thereof.

19. A process according to claim 17 wherein said Group VIII metal is selected from cobalt, iron, nickel, ruthenium, rhodium, palladium, and combinations thereof.

20. A process according to claim 17 wherein said rare earth metal is selected from lanthanum, cerium, neodymium, samarium, gadolinium, dysprosium, erbium, ytterbium, and combinations thereof.

21. A process according to claim 17 wherein the one or more promoters comprise rhenium.

22. A process according to claim 13 wherein said sodium solubilization rate has been achieved by a means effective in rendering the ionizable species ionic and removing that species, or rendering the ionizable species insoluble, or rendering the ionizable species immobile.

23. A process according to claim 22 wherein said means is selected from washing, ion exchange, volatilizing, impurity control, precipitation, sequestration, and combinations thereof.

24. A process according to claim 13 wherein said carrier is an alumina-based carrier.

25. A process according to claim 24 wherein said alumina-based carrier is  $\alpha$ -alumina.

26. A process according to claim 13 wherein the amount of a Group IA metal, if present, is in the range of from about 10 ppm to about 1500 ppm, by weight of the total catalyst, expressed as the metal; the amount of a Group VIIB

metal, if present, is less than about 3600 ppm, by weight of the total catalyst, expressed as the metal; and the amount of silver is in the range of from about 1 percent by weight to about 40 percent by weight of the total catalyst.

27. A process according to claim 13 wherein said carrier has a surface area in the range of from about 0.05 m<sup>2</sup>/g to about 10 m<sup>2</sup>/g.

28. A catalyst comprising a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes; and deposited on said carrier a catalytically effective amount of one or more catalytically reactive metals comprising silver, and one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.

29. A catalyst according to claim 28 wherein the one or more promoters comprise lithium.

30. A catalyst according to claim 29 wherein the one or more promoters comprise in addition a Group IA metal which is selected from potassium, rubidium, cesium, sodium, and combinations thereof.

31. A catalyst according to claim 29 wherein the one or more promoters comprise in addition a Group IA metal which is cesium.

32. A catalyst according to claim 28 wherein the one or more promoters are selected from sulfur, phosphorus, boron, fluorine, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.

33. A catalyst according to claim 32 wherein said Group IIA metal is selected from magnesium, calcium, strontium, barium, and combinations thereof.

34. A catalyst according to claim 32 wherein said Group VIII metal is selected from cobalt, iron, nickel, ruthenium, rhodium, palladium, and combinations thereof.

35. A catalyst according to claim 32 wherein said rare earth metal is selected from lanthanum, cerium, neodymium,

samarium, gadolinium, dysprosium, erbium, ytterbium, and combinations thereof.

36. A catalyst according to claim 32 wherein the one or more promoters comprise rhenium.

37. A catalyst suitable for the vapor phase production of epoxides comprising a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes; and deposited on said carrier a catalytically effective amount of one or more catalytically reactive metals comprising silver, and one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.

38. A catalyst according to claim 37 wherein the one or more promoters comprise lithium.

39. A catalyst according to claim 38 wherein the one or more promoters comprise in addition a Group IA metal which is selected from potassium, rubidium, cesium, sodium, and combinations thereof.

40. A catalyst according to claim 38 wherein the one or more promoters comprise in addition a Group IA metal which is cesium.

41. A catalyst according to claim 37 wherein the one or more promoters are selected from sulfur, phosphorus, boron, fluorine, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.

42. A catalyst according to claim 41 wherein said Group IIA metal is selected from magnesium, calcium, strontium, barium, and combinations thereof.

43. A catalyst according to claim 41 wherein said Group VIII metal is selected from cobalt, iron, nickel, ruthenium, rhodium, palladium, and combinations thereof.

44. A catalyst according to claim 41 wherein said rare earth metal is selected from lanthanum, cerium, neodymium, samarium, gadolinium, dysprosium, erbium, ytterbium, and combinations thereof.

45. A catalyst according to claim 41 wherein the one or more promoters comprise rhenium.

46. A catalyst according to claim 37 wherein said carrier is an alumina-based carrier.

47. A catalyst according to claim 46 wherein said alumina-based carrier is  $\alpha$ -alumina.

48. A catalyst according to claim 37 wherein the amount of a Group IA metal, if present, is in the range of from about 10 ppm to about 1500 ppm, by weight of the total catalyst, expressed as the metal; the amount of a Group VIIB metal, if present, is less than about 3600 ppm, by weight of the total catalyst, expressed as the metal; and the amount of silver is in the range of from about 1 percent by weight to about 40 percent by weight of the total catalyst.

49. A catalyst according to claim 37 wherein said carrier has a surface area in the range of from about 0.05 m<sup>2</sup>/g to about 10 m<sup>2</sup>/g.

50. A process for the vapor phase production of epoxides, said process comprising passing a feedstock over a catalyst bed at pressure and temperature and recovering an epoxide product; wherein said catalyst comprises a carrier having a sodium solubilization rate no greater than 5 ppmw/5 minutes, and deposited on said carrier a catalytically effective amount of one or more catalytically reactive metals comprising silver, and one or more promoters selected from sulfur, phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, rare earth metals, and combinations thereof.

51. A process according to claim 50 wherein a nitrogen oxide is added to said feedstock.

52. A process according to claim 50 wherein said catalyst is made by the process wherein said wherein said metal is deposited on said carrier by submersing said carrier in an impregnation solution wherein a hydrogen ion activity of said solution is lowered.

